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APOLLO MONTHLY PROGRESS REPORT (U)

NAS9-150

1 April 1963

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This report covers the period from 16 February to 15 March 1963.

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NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

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CONTENTS

PROGRAM MANAGEMENT

STATUS SUMMARY

Boilerplate 6 was received in the interim test preparation area during the report period.

The instrumentation system for boilerplate 6 has been operationally checked out and delivered for installation.

At NASA direction, boilerplate 9 was delivered to Houston instead of Huntsville.

The sixth test firing of the launch escape and pitch control motors was successfully accomplished during the report period.

A successful drop test using a ringsail three-parachute cluster was conducted at El Centro, California.

Tower jettison motor development testing continued on schedule, with eight additional tests successfully completed.

Boilerplate 19 was completed and accepted by NASA. It was delivered to Northrop-Ventura for parachute recovery tests and operations.

CONTRACTS

Firm Cost Proposals Submitted to NASA

The proposal for contract change authorization (CCA) 16 for modification of the C133-A aircraft was submitted to NASA during the report period. A no-cost proposal for CCA 9, for the deletion of the instrumentation test console as a GSE requirement, was also submitted.

An amended proposal that decreased the amount of the proposal previously submitted for contractor furnished equipment (CFE) items was submitted. This decrease was due to the deletion of two items and the ajustment of CFE and spares prices between WSMR and AMR.

[redacted]

A no-cost proposal for CCA 20, the installation of the umbilical cable and J-box in the Little Joe II launch tower at WSMR by Convair, was submitted.

Preliminary Cost Proposals

Preliminary contract change proposals (CCP's) were submitted to NASA to provide a loudspeaker system in the command module, a mobile van, and installation of R & D checkout equipment instrumentation.

Contract Amendments

The amendment incorporating the spare parts and GSE provisioning procedures into the letter contract was received and accepted by S&ID during the report period.

ASSOCIATE CONTRACTOR RELATIONS

Grumman and S&ID are conducting a coordinated study of systems and components that may have common application to the spacecraft and lunar excursion module.

SUBCONTRACT STATUS

The negotiation bases for nine of the major subcontractors have been presented to NASA for review. During the next report period, one more subcontractor base will be presented and additional data will be submitted. Negotiations have been completed with three contractors, and contracts are being written. Negotiations are currently in process with two additional contractors. The target dates for the balance of the negotiations are listed below:

Subcontractor	Target Date
Aerojet	April 1963
AiResearch	April 1963
Collins	April 1963
Marquardt	April 1963
Minneapolis-Honeywell	April 1963
Northrop-Ventura	April 1963
Pratt & Whitney	April 1963
Beech	April 1963
Douglas	March 1963

[redacted]

NEW PROCUREMENTS

During the report period, the Airite Products Company was selected as the contractor for the Apollo helium tanks, and the Allison Division of General Motors was selected as the contractor for the Apollo oxidizer and fuel tanks. Following is a list of items to be ordered, together with their anticipated order dates:

Items	Target Date
Mission simulator	March 1963
Radome	April 1963
2 kmc antenna	April 1963
Beacon antenna	April 1963
In-flight test system	April 1963
Propellant quantity indicating system	April 1963
Propellant gauging system	April 1963
TV Camera	April 1963

[redacted]

DEVELOPMENT

TECHNOLOGY

Flight Performance and Control

Preliminary analyses of the lunar excursion module descent profiles in the vicinity of the moon revealed one profile that has considerable merit. This profile (see Figure 1) consists of tangentially retroing the combined spacecraft and lunar excursion module from an initial circular orbit into an elliptic orbit that overflies the intended landing site at perilune. The spacecraft remains in the elliptic orbit while the lunar excursion module is on the lunar surface. An operational line-of-sight capability between the vehicles is maintained during the descent and ascent maneuvers of the lunar excursion module.

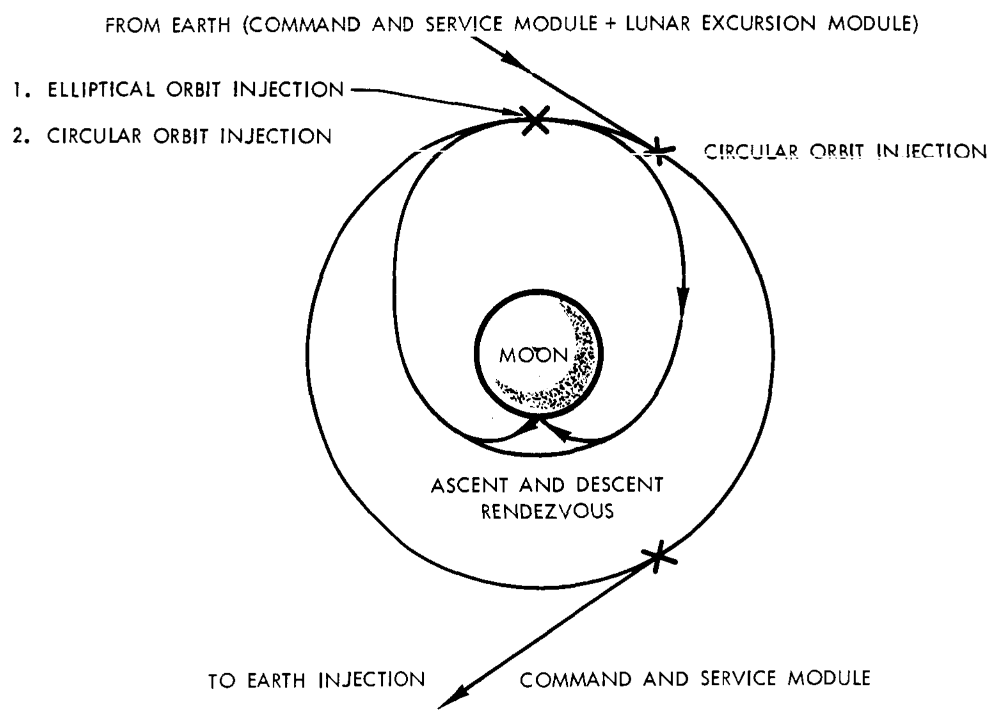

Figure 1. Lunar Excursion Module Descent Profile

[redacted]

Advantages of this profile are:

1. The total mission propulsion requirements are reduced as discussed in the following paragraph. This results in a reduction in the lunar injection weight.
2. The maneuvering required by the spacecraft to recover the lunar excursion module in the event of a lunar excursion module propulsion failure is simplified.
3. The number of propulsion applications by the lunar excursion module is minimized.

Two variations of this profile, differing only in perilune altitude, are available. The variation that results in a maximum propellant savings of approximately 1398 pounds for the service module and 1161 pounds for the lunar excursion module requires one additional propulsion application by the lunar excursion module. The alternate method requires an increase of 175 pounds of propellant in the lunar excursion module but saves 1269 pounds of service module propellant. These weight savings are based on a circular lunar orbit altitude of 80 nautical miles; savings increase as the orbital altitude increases. The savings represent differences between propellant requirements for the profile under discussion and those of the equal-period orbit.

Studies were made to determine if an abort from lunar orbit could be made using the propulsion stages of the lunar excursion module. This requirement would exist if the service propulsion system engine fails prior to lunar excursion module separation for lunar descent. Assuming a full load of service module propellant (except for that consumed for cislunar corrections and lunar orbit injection), sufficient lunar excursion module propulsion is available to inject the command and service modules into an earth-return trajectory that is identical to the normal circumlunar free-return coast trajectory. A ΔV reserve of up to 287 feet per second remains in the lunar excursion module second stage for earth-return midcourse corrections.

Studies indicate that the service module reaction control subsystem (RCS) is capable of providing retro for emergency ejection from earth orbit if an adequate amount of RCS propellant is available. Approximately 230 pounds of RCS propellant are required to deorbit a 20,000-pound spacecraft from a 100 nautical mile orbit. The range for this entry would be 10,800 nautical miles.

Because the S-IV boost vehicle may pitch-up with rates as high as 1 degree per second when its guidance system is activated, the time between launch escape subsystem (LES) tower jettison and S-IV activation must be restricted to assure adequate vehicle-tower miss distance. Consequently, studies were made to determine tower jettison time and S-IV guidance activation constraints for all Saturn I missions. These times are as shown on the following page.

[redacted]

1. Jettison of the launch escape tower: 10 seconds after the S-IV ignition signal

2. Activation of the S-IV guidance system: not less than 15 seconds after the S-IV ignition signal

A study was conducted to determine the minimum over-all computation-cycle time required for the MIT entry guidance mechanization. The study was based on the Mode 2 MIT steering equations of August 1962. Mode 2 occurs between entry pullout and exit from the pullout. The results showed the following asymptotic stability boundaries:

1. Apollo guidance computer computation cycle time: < 4 seconds

2. Steering gain: > 1.67×10^{-3} seconds per foot

The computation-time cycle is a firm value. The steering gain is subject to change, however, if the present MIT steering equations are changed.

Statistical results from docking simulation studies indicate that an attitude control deadband of ±1 degree is preferred to a ±5 degree deadband for the S-IVB boost vehicle, because of a lower miss distance at contact. Also investigated in this study was the feasibility of decreasing miss distance by providing the astronaut with better line-of-sight information. The use of a collimated gunsight (instead of a probe) increased alignment accuracy, but not enough to compensate for a resultant 11-pound (45 percent) increase in RCS fuel consumption. This increase is caused by additional corrections made by the astronaut because of his ability to detect smaller alignment errors than can be detected by the present probe system.

<u>Thermodynamics and Fluid Dynamics</u>

Analysis of the LES solid particle trajectories indicates plume particles will impinge only on the command module; therefore, no additional protection will be required for the LES tower structure.

The feasibility of eliminating the command module strakes by employing a portion of the LES tower structure to effect an apex-aft command module stability condition was investigated. The flap did not prove to be an effective replacement for the strakes, as an apex-forward trim point exists at both subsonic and supersonic Mach numbers.

Environmental control subsystem (ECS) requirements were established for man-rating spacecraft 001, the service propulsion system static firing test vehicle. The system will support two men for ten hours. Cooling modes

[redacted]

include both on-board Freon and externally supplied ethylene glycol. Metabolic oxygen requirements are met by compressed air; carbon dioxide removal is provided by standard Apollo absorption canisters.

Performance analysis of the full-scale service propulsion subsystem (SPS) engine indicates a nominal delivered specific impulse value of 317.2 seconds, initially; 315.8 at 750 seconds; and 316.6 seconds as an average. The corresponding minus three sigma values of specific impulse are 314.2, 312.8, and 313.6, respectively. These values are slightly lower than initial specification limits. The data obtained are being analyzed to determine the effects on spacecraft propellant loading and mission.

The 0.085-scale H_2O_2 jet-effects model was delivered to Langley Research Center for testing to determine the stability characteristics of the boost vehicle with the launch escape motor operating. Data will be obtained for the Mach number range from 0.7 to 1.3. Design was begun on the 0.045-scale cold-flow jet-effects model for AEDC, where the stability characteristics tests will be extended to Mach 3.5.

Since excessive heating of the service module radiators does not occur during boost, the radiators and water-glycol lines could be filled before launch rather than after boost as presently planned. This procedure would eliminate the need for increasing the capacity of the supply tank. To provide for ground filling, the vent line should be relocated and a relief valve added for liquid expansion.

Life Systems

A new main display-panel design uses toggle switches and both round and linear indicators in place of rocker switches and only linear indicators.

Data analysis from Phase II of the simulation study to evaluate man's ability to manually control vehicle attitude about three axes has been completed. Control handles with cross, T, and command module shapes were evaluated for use in the spacecraft. Results indicate that with the cross-shaped and command module-shaped handles, the crew can adequately control the attitude of all three vehicle configurations during free flight with sufficient accuracy and non-excessive fuel consumption. Control by the T-shaped handle was not considered adequate because weight distribution and spring loading were such as to make it very sensitive, causing excessive fuel consumption.

An analysis was performed to establish the Apollo crew task index for normal, manual, and abort modes during countdown, prelaunch, launch and ascent mission phases. This index will be used as a guide for performing subsequent crew performance task analysis and will be included in Flight Crew Performance Specification, SID 62-90.

The chest and rib reinforcement fittings of the Apollo restraint harness were redesigned because the previous design failed to withstand a tensile load of 1800 pounds. The previous design failed at a tensile load of 1100 pounds and a modification of the design failed at 1600 pounds.

Couch position tests were completed during this report period. The tests revealed that visual and reach functions can be performed satisfactorily.

Simulation and Trainers

Extensive modifications are nearing completion to update the evaluator I complex to the latest spacecraft design and prepare for future studies. These modifications include reconstruction of the bulkheads and side panels, the installation of new windows, and the relocation and configuration change of the navigation and guidance panel in the command module mock-up.

A recently completed central control console to handle the interface between the command module and the computers has been incorporated to improve the evaluator I complex.

These modifications should be completed and checked out during the next report period; the evaluator I complex will be ready to evaluate studies for manual rendezvous capabilities.

Computer mechanizations to investigate automatic rendezvous techniques were continued. The automatic rendezvous technique study using equations of motion to describe Apollo guidance and control systems has been checked out and is operable. This study will establish automatic rendezvous techniques and will confirm compatibility of the rendezvous guidance system with the remaining Apollo subsystems.

Structural Dynamics

The digital computer program to analyze the tumbling (roll-over) landing has been written and is being checked out. The method provides for six degrees of freedom and makes it possible to handle a case in which lateral translations and rotations occur during the landing sequence.

Initial flotation and water impact tests were conducted on the 1/10-scale command module model in a laboratory water tank. The first series of tests (147 drops) were made to define a stability envelope. The test facility provided excellent results.

Bending modes were calculated for the lunar excursion module, service module, and command module configuration using revised stiffness data. Four modes were calculated for each of three fuel conditions: full, three-quarters full, and one-half full. The information obtained will be used in the analysis of the stabilization and control subsystem (SCS).

Modes of the Saturn V lunar orbital rendezvous configuration were calculated using estimated stiffness levels for Apollo spacecraft and Apollo boilerplate vehicles. Boilerplate articles have a greater natural frequency than spacecraft (prototype) articles. Consequently, the results of previous dynamic tests with boilerplate articles must be examined carefully to avoid interpretation as results that might be obtained with prototype articles.

SPACECRAFT AND TEST VEHICLES

Structures

A program to investigate decreased landing impact accelerations by increasing command module pitch angles continued with the first water drop test. The test used the newly activated impact facility and boilerplate 2. The module pitch angle was 25 degrees, the horizontal velocity was 10 feet per second, and the vertical velocity was 25 feet per second. Results of this test will be analyzed during the next report period.

The angle of pitch used in land drops tests was increased from 5 degrees to approximately 30 degrees. A 30-degree angle of pitch will enable the spacecraft to roll more, decreasing initial landing shock. Boilerplate 1, to be used in these tests, underwent a major structural modification to incorporate a crushable landing edge. This modification was necessary because the boilerplate was constructed for low pitch angles and simulated actual spacecraft structure only in the lower portion.

Meteoroid impact test firings are being performed at the Goleta facility of General Motors to check out instrumentation and range operation before initiation of a program to evaluate the effects of meteoroid impact and penetration on spacecraft structures.

An investigation to determine the possibility of using PH14-8 Mo stainless steel as a back-up material for the PH15-7 Mo heat shield substructure is continuing. Forming, welding, brazing, and chemical milling characteristics are being studied. This investigation has revealed the notch toughness of PH14-8 Mo to be superior to that of PH15-7 Mo in the range of -200 to -320 F.

Five parachute drop tests were conducted during this report period. Test 25 on 15 February employed a two-chute cluster dropped from 15,000 feet at a dynamic pressure of 97 pounds per square foot. Recovery was normal, with minor damage common for the 1.5 dynamic pressure design condition. Test 26 on 20 February showed successful drogue chute mortar deployment and was dropped from 25,000 feet at a dynamic pressure of 140 pounds per square foot. On Test 27, 1 March, a three-chute cluster failed to deploy due to improper arming of the vehicle prior to drop. As a result, the arming safety mechanism has been changed to prevent future occurrences of this nature. Test 28 on 8 March used a three-chute cluster with a bomb weighing 9120 pounds dropped from 15,000 feet at a dynamic pressure of 64 pounds per square foot. Recovery was successful. Test 29 on 14 March used the rebuilt parachute test vehicle and a three-chute cluster dropped from 22,000 feet at a dynamic pressure of 64 pounds per square foot. Again, recovery was successful.

The first service module radial beam fabricated by the numerical control method showed a weight saving of approximately two pounds. The weight saving is attributed to the improved accuracy of tolerance control in the numerical control machining operation.

Authorization was received to provide Convair with a ground handling mock-up of the LES tower, including a surplus rocket case. The mock-up was structurally modified and ballasted to simulate boilerplate hardware and to withstand the aerodynamic loads to be encountered during Little Joe II flight qualification tests.

Guidance and Control

Coordination meetings between S&ID and Minneapolis-Honeywell on packaging, installation, and weight of the SCS established the type of electronic connector to be used, the number of pins required, and the locations of the connectors on the electronic control packages.

The preliminary navigation and guidance countdown procedures for Saturn I manned flight have been prepared using three different crewmen entry times of T-6:00, T-3:00, and T-1:30. The results will be combined with other prelaunch system procedures to establish an optimum time prior to launch for crewmen entry.

An equipment failure mode analysis has been completed for use in establishing navigation and guidance procedures for primary and failure modes, and maintenance and failure back-up modes. Similar analyses will be made for navigation and guidance entry mode, navigation and guidance ascent monitor mode, and navigation and guidance attitude control mode.

Telecommunications and Instrumentation

S&ID, Collins Radio, and Hughes, the manufacturer of the traveling wave tube, completed a joint investigation to determine the cause of recent wave tube failures. Three of the four tube failures reported to date have been traced to a fault in the test equipment power supply overload protection circuitry. The investigation revealed that a transistor that was put into use during the second tube test, though it was within specifications, differed

[redacted]

enough from the transistor used in the first test so that proper operation was not attained during subsequent testing.

Scimitar antennas enclosed in the aerodynamic strakes and flush mounted modified annular slot antennas are being investigated as a replacement for the present VHF/2kmc antenna configuration. Current design places the antenna in the command module nose cone and requires that it be folded back to permit lunar excursion module docking. Serious degenerations of the antenna patterns occur with the antenna folded back. Also, maneuvering of the lunar excursion module into the docking position poses a potential hazard to the present antenna arrangement.

The instrumentation system for boilerplate 6 has been operationally checked out and delivered for installation. Boilerplate 12 installation design is completed, and approximately one-third of the 192 instrumentation components have been received. The breadboard for boilerplate 12 is expected to arrive from NASA on 18 March, with checkout scheduled to be completed by 19 April.

Environmental Control Subsystem

Steady state performance analysis of the Apollo environmental control subsystem (ECS) has been completed. Digital computer solutions indicate that the command module interior temperature can be maintained between 70 and 80 F during all flight operating conditions except during prelaunch when the highest heat loads occur and the maximum cabin temperature will be approximately 84 F. Because this is a launch pad condition that will rarely occur, no system redesign for this condition is being considered.

The silver eutectic bonding process has been selected for fabrication of the coolant system coldplates. The silver eutectic process was chosen because extreme flatness, minimum weight, ultra-high strength joints, small clear passages for maximum flow control, and quick fabrication can be achieved.

The ECS cabin return air check valve is being relocated to allow the demand pressure regulator to better perform its function and prevent the cabin return check valve from opening before the demand regulator operates. This also makes it possible to isolate the suit circuit from the cabin atmosphere under normal operating conditions.

Electrical Power

Mounting configurations and line routings for the fuel cells are undergoing redesign because vibration studies of the service module structures indicated that lateral motion problems would prevail.

The spacecraft battery specification was revised to incorporate the design changes reported last month. S&ID began testing a breadboard model of the spacecraft battery charger developed by International Telephone and Telegraph.

[redacted]

[redacted]

A study to determine a method for charging the spacesuit backpack battery by using the spacecraft battery charger indicates this can be accomplished by providing an external sensing and control device. The use of any external servicing and control device will also result in a weight and cost saving. The study also indicated that no change will be required in the maximum battery-charging rate of 2.5 amperes.

A study was made to determine the effects of separating the pyro wires from other wiring in the command module-service module wire bundles. The results of this study show that there is no appreciable hazard reduction and that considerable weight (18 pounds) and volume penalties would be added. Also, the pyro cable would pass near the C-band antenna, possibly introducing spurious radiation into the pyro cable. The pyro cable would also require one additional pressure bulkhead feedthrough.

Service Propulsion Subsystem

Thirty firings were accomplished in the service propulsion engine injector development program. An unbaffled aluminum injector, S/N AF-1 (triplet), demonstrated stable operation, but instability was induced with a five-grain charge. Instability had been induced on this injector previously with a ten-grain charge. A baffled injector, S/N BF-8 (triplet), suffered cracked baffles during extended-duration firings at Azusa. Testing will continue on two baffled injectors, S/N BF-11 (triplet) and BF-12 (doublet), which have thus far demonstrated stable operation. Characteristic exhaust velocity testing continued with two firings on injector S/N AF-2 (quadlet). Performance was 98 percent of theoretical. Testing will continue with two injectors, including the first injector for Phase I of the AEDC program.

Four propellant tanks for the F-2 test fixture have passed pressure testing to ASME acceptance codes. Test fixture F-3 was delivered from the Los Angeles Division of NAA to S&ID during the report period.

Reaction Control Subsystem

Rocketdyne fired the first command module RCS engine. After approximately 30 firing pulses that totalled 82 seconds of accumulated operation, a hole was burned through the side of the nozzle at the bond between the chamber and nozzle billets.

Marquardt is hot-firing four prototype service module RCS engines and has accomplished initial vibration and humidity testing. The primary problem experienced to date has been leakage through the propellant valves

[redacted]

for various reasons. In one case, a leak was traced to a damaged oxidizer valve seat; in another, it was caused by insufficient torquing of flange bolts. Investigations of all leaks are being made to trace the source to ensure proper corrective actions.

The command module and service module RCS display and control panel has been revised so that the astronaut can control the individual helium-source-isolation valves and each pair of propellant-isolation valves. This control arrangement makes it possible for the crew members to isolate malfunctioning subsystems while maintaining system operation.

Tests were conducted on the command module RCS breadboard propellant tanks to determine if the bladder would extrude or rupture into the outlet port of the tanks. A pressure of 300 psig was applied to the bladder for one minute, and the procedure repeated ten times. Imprints of the outlet orifice were noted on the bladder; no extrusion occurred. No extrusion or rupture occurred when the test, with extended time durations, was repeated for six hours.

Launch Escape Subsystem

Launch escape motor LE-11A was fired at 70 F with a modified igniter. The new annular plastic nozzle and an additional initiator-pellet mass in the modified igniter succeeded in reducing the thrust rise time at 70 F to 80 milliseconds, which is within specification limits.

Seven tower jettison motors were fired and demonstrated normal operation during the report period. Test conditions were as shown below. A live tower jettison motor for boilerplate 6 was shipped to WSMR.

Motor Number	Test Conditions
AD-5	Temperature cycled, drop tested, fired at 20 F
AD-9	Fired at 70 F
AD-10, AD-11	Condition to 70 F and 100,000-foot simulated altitude Firings at AEDC
AD-12	Conditioned to 20 F, altitude ignition
AD-13	Conditioned to 140 F, altitude ignition
AD-14	Conditioned to 20 F

INTEGRATION

Systems Integration

A study is being made of two basic adapter configurations to accommodate the lunar excursion module. Pure conical adapters are being compared with those having cylindrical forward sections and conical aft sections. All designs provide for a lunar excursion module interface with the adapter so that only the adapters need interface with the S-IVB booster. Study progress is contingent upon Grumman Aircraft furnishing additional information on the lunar excursion module body envelope and landing gear configuration.

Command module-lunar excursion module docking studies are being made to analyze various system concepts. NASA, S&ID, and Grumman Aircraft presented a number of concepts at the mechanical systems panel meeting at Houston in March. Four concepts were selected for further study and predesign development by S&ID.

The present schedule, formulated at the meeting, requires S&ID to present study results, predesigns of the four selected concepts, and the S&ID-recommended concept at the 21 May 1963 mechanical systems meeting. A final concept is to be selected at this meeting for detail design development.

Documentation of vacuum chamber requirements at AMR has been sent to NASA. These requirements describe the checkout objectives, support equipment requirements, facility requirements, and vacuum chamber design considerations. This document provides a single source of reference information for discussion and coordination of AMR vacuum chamber use and requirements.

Ground Support Equipment

All GSE drawings for boilerplate 6 equipment have been released. A continuing process of updating these drawings is being made to reflect the latest revisions and solutions to shop problems. Those models that are applicable to both boilerplates 6 and 12 are being modified to the boilerplate 12 configuration.

All GSE mechanical items required to support boilerplate 9 have been successfully fit-checked to ensure correct function. These items will be sent to NASA at Houston and Huntsville to be used in boilerplate 9 tests.

NASA approval was obtained for five of seven PACE-spacecraft model numbers and the following models of GSE were released:

Ground cooling cart	A14-011
Boatswain's chair	H14-093
External access stand	H14-109
Internal access stand	H14-110
Helium transfer unit	S14-009
R & D instrumentation cooling system servicing unit	S14-055

All portions of the GSE response system S-blocks have been wired in the S&ID engineering development laboratory. Tests were started on individual components of the system.

Reliability

Work has been initiated to completely revise the Apollo reliability program plan by updating all material, including the recent reorientation of the qualification program through elimination of the requirement for reliability demonstration testing. A redefinition of the method of reliability assessment is in work.

OPERATIONS

DOWNEY

Boilerplate 6 was received in the interim test preparation area during the report period. Receiving inspection and command module-to-pad adapter mating has been accomplished. Checkout and modifications are in work.

Test preparation personnel continued procurement and coordination of information for test procedures pertinent to boilerplates 12 and 13. Forty-six operation test procedures for boilerplate 6 will be validated in the test preparation area.

The boilerplate 6 instrumentation breadboard checkout, including all spare items, was completed during the report period.

Checkout of the boilerplate 12 breadboard is to be completed during the next report period.

The detailed test plan for spacecraft 006 environmental vibration and acoustic tests is in work. The plan will cover all phases of the environmental test program pertaining to spacecraft 006 and will be incorporated in the General Test Plan.

An S&ID/MIT work group has been established to develop navigation guidance and test procedures for individual, combined, and integrated systems testing.

Revisions to the service propulsion development test support requirements document were completed during the report period.

Antenna "hat" requirements for Downey test sites were determined and hardware specifications for GSE and systems design are being determined.

All environmental proof testing on spacecraft 008 will be conducted at NASA, Houston. The combined systems test unit (CSTU) concept has been dropped and an automated commutational data system concept will be used.

A commutated data acquisition instrumentation concept was formulated and the responsibilities for the concept were delegated to S&ID instrumentation, test operations, and NASA. Spacecraft 008 GSE hardware and need date requirements were published.

[redacted]

WHITE SANDS MISSILE RANGE

The inert launch escape and pitch control motors were received by the flight test support group. The inert jettison motor was delivered to the subcontractor for use on the launch escape subsystem (LES) static test. A second inert jettison motor was purchased, with delivery scheduled during the next report period.

The preliminary engineering safety design proposal for manned-mated testing will be presented to NASA on 15 March 1963.

ATLANTIC MISSILE RANGE

The final revision of the detail test plan for boilerplate 13 has been completed. This document was sent to NASA.

Detailed area layouts for both interim and Merritt Island facilities that reflect test checkout requirements are being prepared. Upon completion, these layouts will be transmitted to NASA to support studies and space allocation decisions. These layouts are to be completed during the next report period.

Preparation of the operational test procedures for boilerplate 13 will continue during the next report period.

Work will continue in the preparation of detail area layouts for the various AMR facilities.

LOGISTICS SUPPORT

Training

The new general order level PERT network for training and simulation is ready for NASA review.

The lack of descriptive material on the MIT navigation and guidance panel displays and controls is delaying the analyses for crew training units.

Field Engineering

Operations support of the test site at WSMR started during the report period.

In conjunction with NASA representatives, two separate lists of spares for support of the R & D instrumentation checkout console were submitted to MSC for approval.

[redacted]

Seventeen of the eighteen GSE end items for support of boilerplate 9 were shipped to Houston on 12 March.

Logistics Engineering

Revision of the ground support equipment and requirements document was completed and sent to NASA. A total of 228 models of GSE have been evaluated as requirements for the Apollo program. There are now 25 models of GSE government furnished property (GFP) identified with program needs.

Support Manuals

The transportation and handling manual was submitted to NASA during the report period.

Support manuals for boilerplate 6 and select major items of GSE will be delivered in time to support the WSMR test. Preparation of support manuals for boilerplates 12, 13, and 23 and associated GSE has been started.

FACILITIES

DOWNEY

Test Systems and Manufacturing Support

Documents for the procurement of the environmental control vacuum chamber for the space system development facility have been processed.

The 18-foot diameter centrifuge specification for the space system development facility was completed.

Facilities Projects

Construction of the bonding and test facility is on schedule.

The impact test facility was completed. On 11 March the first swing and drop test was successfully conducted.

The plaster master facility was completed and occupied during the report period.

PROPULSION SYSTEMS DEVELOPMENT FACILITY

The master planning study of the propulsion systems development facility at WSMR has been completed. A NASA review meeting has been scheduled. A complete plan of action has been formulated and is being implemented to expedite design and construction.

APPENDIX A

S&ID SCHEDULE OF APOLLO MEETINGS AND TRIPS

Table 1. S&ID Schedule of Apollo Meeting and Trips
16 February to 15 March 1963

Subject	Location	Date	S&ID Representatives	Organization
Negotiation base presentation	Houston, Texas	17-19 February	Greenfield, White, Stady, Wessling	S&ID, NASA
Crew systems meeting and space suit discussion	Houston, Texas	17-20 February	DeWitt	S&ID, NASA
Contract negotiations	Houston, Texas	17-20 February	Sack, Wilkinson, Edwards	S&ID, NASA
Manufacturing tooling meeting	Cambridge, Massachusetts	18 February	Todd	S&ID, MIT
Contract meeting	Redlands, California	18-20 February	Bergeron, Briggs, Meyers, White	S&ID, Lockheed
Boilerplate coordination	Downey, California	18-21 February	Pearce	S&ID, NASA
Contract negotiations	Houston, Texas	18-21 February	Clary, Frankos, Jacobson, Vucelic, Milliken, Bellamy, Ashton, Field, Skene, Walkover, Stone, Olsen	S&ID, NASA
Fact finding discussion	Houston, Texas	18-27 February	Templeton, Perkins, Leine, McDermott	S&ID, NASA
Heat shield proposal	Houston, Texas	19 February	Hanifin, Gershun, King, Morant, Olsen	S&ID, NASA
Final review	White Sands, New Mexico	19 February	Williamson, Zeek, Mather	S&ID, NASA
Launch panel discussion	Houston, Texas	19 February	Weido	S&ID, NASA

Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Subcommittee meeting	Houston, Texas	19 February	Nelson, Champaign, Groharing, Nichols, Robinson	S&ID, NASA
Simulation meeting	Downey, California	19-20 February	Day, Todd, Steiner	S&ID, NASA
Wind tunnel discussion	Mountain View, California	19-20 February	Allen, Takvorian	S&ID, Ames
Engineering meeting	Houston, Texas	19-21 February	Feltz	S&ID, NASA
Gemini hand controller meeting	St. Louis, Missouri	19-21 February	Campbell	S&ID, McDonnell
GSE meeting	Houston, Texas	19-21 February	Kiehlo, Lindley, Raridan, Nutzman, McMillian, Shelley, Randall, Monfort, McMillin	S&ID, NASA
Engineering liason	Rolling Meadows, Illinois; Cambridge, Massachusetts	19-21 February	Perkins	S&ID, Elgin Watch Co. S&ID, MIT
Briefing	Tulsa, Oklahoma	19-21 February	Fazioli, Thompson, Peck, Wilson, Lindsay	S&ID, NAA-Tulsa
Negotiation base presentation	Houston, Texas	20-26 February	Carter	S&ID, NASA
Contract negotiations	Sacramento, California	20-26 February	White	S&ID, Lockheed

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Boilerplate modification	Thousand Oaks, California	20 February 2 March	Brayton, Dowling, Cooper, Herriage, Widener, Gibbs	S&ID, Northrup-Ventura
Collins facilities	Downey, California	21 February	Dieterle	S&ID, NASA
Cost negotiations meeting	Houston, Texas	21-25 February	Gildea, Cole, Dudek, Cross, Walli, Brewer, Wells, Rabideau, Wingo, Cross	S&ID, NASA
Engineering cost negotiations	Houston, Texas	22 February	Sack, Carroll, Bashara	S&ID, NASA
Quarterly briefing	Downey, California	22 February	Webb	S&ID, Marquardt
Capabilities presentation	Downey, California	22 February	Greenfield	S&ID, General Electric
Coordination meeting	Van Nuys, California	22 February	Cooper	S&ID, Marquardt
Trade-off studies meeting	Houston, Texas	24 February	Graham, Jacobson, Puterbaugh, Fleck	S&ID, NASA
Contract negotiations	Houston, Texas	24 February	Osbon	S&ID, NASA
Antenna system recovery	Melville, Long Island, New York	25 February	Dwyer, Shaw	S&ID, Airborne
Central timing system debriefing	Downey, California	25 February	Toomey	S&ID, E. M. R.
Weekly staff meeting	White Sands, New Mexico	25 February	Proctor, Stungis	S&ID, NASA
Joint occupancy problems discussion	White Sands, New Mexico	25 February	Robertson	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Contract preparation	Wilmington, Massachusetts	25 February	Kerr	S&ID, NASA
Cost negotiation meeting	Houston, Texas	25 February	Laubach, Simkin, Lundgren	S&ID, NASA
Human factors specification development	Washington, D. C.	25 February	Rabideau	S&ID, NASA
Negotiation base presentation	Houston, Texas	25-26 February	Kelly, Wermuth, Weller	S&ID, NASA
Space system facility discussion	Houston, Texas	25-27 February	Kiefer	S&ID, NASA
Hardware utilization list	Houston, Texas	25-27 February	Perkins	S&ID, NASA
Contract coordination	Wilmington, Massachusetts	25-27 February	Skene	S&ID, Avco
Coordination meeting	Tulsa, Oklahoma	25-27 February	Clarke	S&ID, NAA-Tulsa
Boilerplate status	Downey, California	25 February 1 March	Eich	S&ID, NASA
GSE and facilities discussion	AMR	25 February 1 March	Yancey, Hiaght, Janus	S&ID, NASA
Contract negotiations	Houston, Texas	25 February 1 March	Akers, Jones, Lane, Goodman, Warriner	S&ID, NASA
Field test problems coordination	White Sands, New Mexico	25 February 1 March	Hannon, Schmuck, Lee	S&ID, NASA
Engineering coordination	Downey, California	25 February 1 March	Jensen, Antletz	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Cost proposal analysis	Sacramento, California	26 February	Madison	S&ID, NASA
Docking study	Columbus, Ohio	26 February	Barnett, Porter, Mason	S&ID, NAA-Columbus
Contract negotiations	Houston, Texas	26 February	Sack	S&ID, NASA
Format technical discussion	Houston, Texas	26 February	Moore, Dorrell	S&ID, NASA
Blue scout materials discussion	Newport News, Virginia	26 February	Taylor	S&ID, Langley Research Center
Testing discussion	Houston, Texas	26 February	Humphrey	S&ID, NASA
Pretest conference	Tullahoma, Tennessee	26 February	Snowden, Udvardy	S&ID, AEDC
Work transfer request coordination coordination	Tulsa, Oklahoma	26 February	Clarke	S&ID, NAA-Tulsa
Communications discussion	White Sands, New Mexico	26-27 February	Mundy	S&ID, NASA
Interface meeting	Houston, Texas	26-27 February	Miller, Hogan	S&ID, NASA
Fact finding discussion	Houston, Texas	26-27 February	Templeton	S&ID, NASA
Range data support discussion	Orlando, Florida	26-28 February	Rutkowski, Moore	S&ID, NASA
Wind tunnel tests	Hampton, Virginia	26 February	Lundy	S&ID, Langley Research Center
Specifications meeting	Tulsa, Oklahoma	26 February 1 March	Walker, Calvert	S&ID, NAA-Tulsa

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Coldplate installation meeting	Minneapolis, Minnesota	27 February	Lee Rose, Gasparre	S&ID, Minneapolis-Honeywell
Electrical panel coordination	AMR	27 February	Gardner, Weido, Dorman	S&ID, NASA
Transceiver and transmitter discussion	Cedar Rapids, Iowa	27 February	Wernick, Herring	S&ID, Collins
Heat shield contract negotiations	Wilmington, Massachusetts	27 February	Skene	S&ID, Avco
Interface studies report discussion	Houston, Texas	27-28 February	Schepak	S&ID, NASA
Fact finding meeting	Houston, Texas	27-28 February	Osbon, Antletz, Levine, Kennedy, Ryker	S&ID, NASA
Packaging redefinition	Cedar Rapids, Iowa	27 February 1 March	Spray	S&ID, Collins
R & D vehicle coordination	Houston, Texas	27 February 15 March	Pope	S&ID, NASA
Thiokol briefing	Downey, California	28 February	Reed	S&ID, Thiokol
Contract negotiations	Houston, Texas	28 February	Sack	S&ID, NASA
Telemetry trailer escort	AMR	28 February	McCarley	S&ID, NASA
Measurement survey	Livermore, California	28 February	Sturkie, Wixtrom	S&ID, Sandia Corporation
C-Band transponder requirements checkout	White Sands, New Mexico	28 February	Nault, Pacillo	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Propagation frequencies discussion	Boulder, Colorado	28 February	Wernick	S&ID, National Bureau of Standards
Hardware specifications data procurement	Boulder, Colorado	28 February	Fletcher, Pinkney	S&ID, National Bureau of Standards
Facilities inspection	Sunnyvale, California	28 February	Monda	S&ID, Thermotest Labs
Nuclear radiation direction	Houston, Texas	28 February	Stazer	S&ID, NASA
Engineering survey	Washington, D. C.	1 March	Womack	S&ID, Emertron, Inc.
Radiation and cosmic ray discussion	Houston, Texas	1 March	Stazer	S&ID, NASA Symposium
Negotiation base presentation	Houston, Texas	1 March	Wermuth	S&ID, NASA
ECS meeting	Downey, California	1 March	Stelzriede	S&ID, NASA
ICD coordination	San Diego, California	1 March	Jacob, Barr	S&ID, General Dynamics/Convair
Visual simulation demonstrations	San Francisco, California	3-5 March	Hart, Schneider	S&ID, Tinley Labs, Morrison-Planitarium, University of California
Negotiation base presentation	Houston, Texas	3-6 March	Tayne, Wermuth, Barker	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Field analysis meeting	Rolling Meadows, Illinois	3-8 March	Cason, Perkins, Travis, Greenfield, Weiss, White, Forrette, Leonard	S&ID, Elgin Watch Co.
Cost negotiations meeting	Houston, Texas	3-8 March	Pomykata, Schwarzman, Jorgenson, Dunn, De Laquil, Nelson, Champaign, Nash, Bellamy, Field, Gibb, Ashton, Bevington, Osbon, Levine, Page, Albinger, Skene, Perkins, Gildea, Cross, Walli, Robertson	S&ID, NASA
Logistics requirements meeting	Houston, Texas; Tulsa, Oklahoma	3-8 March	Scherer, Sandham, Arms	S&ID, NASA S&ID, NAA-Tulsa
Quarterly briefing and monthly coordination	Redlands, California	4 March	Myers	S&ID, Lockheed
Secondary structure meeting	Downey, California	4-5 March	Day	S&ID, MIT
P & W baseline review	Houston, Texas	4-5 March	Edwards, Champaign, Nash, Nelson	S&ID, NASA
Boilerplate status	Downey, California	4-6 March	Feltz	S&ID, NASA
Contract negotiations meeting	Houston, Texas	4-6 March	Ogren	S&ID, NASA, USAF
Measurement list meeting	Houston, Texas	4-6 March	Charnock, Eckmeier, Canin	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips 16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Design and drilling coordination	White Sands, New Mexico	4-7 March	Doyle, Young	S&ID, NASA
GSE meeting	Houston, Texas	4-7 March	Lindley, Hillberg, Waltz, Goatcher, Arms, Williamson, Coulson	S&ID, NASA
Firm cost proposal	Newberry Park, California	4-8 March	Beatty, Dudley	S&ID, Northrup-Ventura
Weight coordination	White Sands, New Mexico	4-8 March	Hedger, Patterson	S&ID, NASA
Technical discussion	Meville, Long Island; Boston, Massachusetts; Baltimore, Maryland	4-8 March	Kramer, McCandless	S&ID, Airborne Inst. Labs S&ID, Ewen Knight Corporation S&ID Johns Hopkins University
Technicians employment meeting	Cocoa Beach, Florida	4-15 March	Libbey	S&ID, NAA-Cocoa Beach
Static firing test support	Redlands, California	4-29 March	Ullery	S&ID, Lockheed
Wind tunnel tests	Hampton, Virginia	4-29 March	Lundy	S&ID, Langley Research Center
Inflight test system	Minneapolis, Minnesota	5 March	Jarvis, Mahan	S&ID, Minneapolis-Honeywell
Fact finding meeting	Houston, Texas	5 March	Osbon, Antletz, Kennedy	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Work transfer coordination	Tulsa, Oklahoma	5 March	Patterson	S&ID, NAA-Tulsa
Internal and external lighting environment meeting	Downey, California	5 March	Olson	S&ID, Grummond
Letter contract negotiation	Downey, California	5 March	Reed	S&ID, Thiokol
Test panel meeting	Houston, Texas	5 March	Pearce, Hannon, Bendees, Williamson, Lee, Stungis	S&ID, NASA
Human impact design review	Houston, Texas	5 March	Shelton, Oliver, Bajkowski, Staniec	S&ID, NASA
Contract negotiations meeting	Houston, Texas	5 March	Sack, Lashbrook, Coulson, Carson, Benner	S&ID, NASA
Interface discussion	Huntsville, Alabama	5-6 March	Miller, Hogan	S&ID, NASA
Equipment contract negotiations	Houston, Texas	5-7 March	Wilkinson	S&ID, NASA
Command module and spacesuit interface meeting	Houston, Texas	5-7 March	DeWitt	S&ID, NASA
Negotiation base presentation	Houston, Texas	5-8 March	Habelberg, Pope, Blakely, Stover, Scherer	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Tests and installation problems	Long Island City, New York	5-9 March	Iwasaki	S&ID, Alderson Labs
Heat transmission meeting	Downey, California	6 March	Alexander	S&ID, Grummond
Contract negotiations meeting	Houston, Texas	6 March	Hershkowitz	S&ID, NASA
Propulsion facility review	Houston, Texas	6 March	Zeminick, Zeek, Williamson, Mather, Lindley, Robertson	S&ID, NASA
Aercelastic and acoustics investigations review	Houston, Texas	6 March	Stevens, Allen, Davey	S&ID, NASA
Contract negotiations meeting	Houston, Texas	6 March	Larson	S&ID, NASA
Navigation and guidance test and operations meeting	Downey, California	6-7 March	Gilio	S&ID, NASA, MIT
Abort capabilities discussion	Houston, Texas	6-7 March	Pope, Kulick	S&ID, NASA
Operations meeting	Downey, California	6-7 March	Pearce	S&ID, MIT
Facility review	Downey, California	6-7 March	Bailey	S&ID, NASA
Entry and recovery review	Houston, Texas	6-7 March	Nelson, Champaign, Nichols, Stelzriede, Scherer, Stoll, Reithmaier	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
S-band equipment discussion	Phoenix, Arizona	6-7 March	Robinson, Hall	S&ID, Motorola
Systems integration meeting	Downey, California	6-8 March	Bailey	S&ID, NASA
Facility design approval	Downey, California	6-9 March	Mundy	S&ID, NASA
Pyrotechnic devices meeting	Downey, California	6-9 March	Johannes	S&ID, NASA
Quality control meeting	Downey, California	6-11 March	Crossfield	S&ID, NASA
Entry problem study	Huntsville, Alabama	7 March	White, Helm, Dupaquier, Henry	S&ID, NASA
Contract negotiations meeting	Houston, Texas	7 March	Kinsler, Templeton	S&ID, NASA
Radiator design and fabrication discussion	East Alton, Illinois	7 March	Synder	S&ID, Olin Mathieson Chemical Corporation
Transmission review	Houston, Texas	7-8 March	Hayes, Atlas	S&ID, NASA
Cost negotiations meeting	Houston, Texas	7-8 March	Cross, Hobbs, Barnett, Gildea	S&ID, NASA
Drawing and construction review	White Sands, New Mexico	7-8 March	Jacob	S&ID, NASA
Jet plume test	Tullahoma, Tennessee	7-22 March	Piesik, Lofland	S&ID, AEDC

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Contract negotiations meeting	Boulder, Colorado	7-31 March	White	S&ID, Beech Aircraft
Monthly coordination	Lima, Ohio	10-11 March	Rood, Milliken	S&ID, Westinghouse
Fact finding meeting	Minneapolis, Minnesota	10-15 March	Anderson	S&ID, Minneapolis-Honeywell
Checkout panel meeting	AMR	11-14 March	Kiehlo	S&ID, NASA
Negotiation base presentation	Houston, Texas	11-14 March	Cubley, Wermuth	S&ID, NASA
Technical and schedule revision	Minneapolis, Minnesota	11-15 March	Dyson	S&ID, Minneapolis-Minnesota
Fuel cell orientation	Hartford, Connecticut	12-14 March	Frankhouse	S&ID, Pratt & Whitney
Reliability and quality	Houston, Texas	12-14 March	Martin	S&ID, NASA
LEM negotiations	Houston, Texas	12-15 March	Griffith-Jones, Martin	S&ID, NASA
GSE servicing equipment meeting	AMR	12-16 March	Goatcher, Alpert, Bouman, Donaldson, Grycel	S&ID, NASA
Metabolic water requirements discussion	Houston, Texas	13 March	Hair, Tarr, Brockman, Haky, Ross	S&ID, NASA
In-flight test systems meeting	Downey, California	13 March	Graham	S&ID, Grummond

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Weekly staff meeting	White Sands, New Mexico	13 March	Proctor, Henderson	S&ID, NASA
Mechanical systems panel meeting	Houston, Texas	13 March	Rodier	S&ID, NASA
Specifications arrangements, malfunctions, and requirements discussion	Houston, Texas	13 March	McIntyre, Smith, Pollard, Marshall	S&ID, NASA
Parachute drop tests	El Centro, California	13-14 March	Wauby, Meyers	S&ID, USN
Data handling problems discussion	White Sands, New Mexico	13-14 March	Trott, Walker	S&ID, NASA
Checkout panel meeting	AMR	13-14 March	Kiehlo	S&ID, NASA
Negotiation proposal presentation	Houston, Texas	13-15 March	Weller, Haeggstrom	S&ID, NASA
Goddard scientific satellite meeting	Washington, D. C.	13-15 March	Stazer	Symposium
Integration coordination	Houston, Texas	13-29 March	Stacy	S&ID, NASA
Hardline installation	Huntsville, Alabama	13 March 2 April	Ward, Lundquist	S&ID, NASA
Contract negotiations meeting	Houston, Texas	14 March	Lashbrook, Coulson	S&ID, NASA

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Table 1. S&ID Schedule of Apollo Meetings and Trips
16 February to 15 March 1963 (Cont.)

Subject	Location	Date	S&ID Representatives	Organization
Boilerplate schedule review	Houston, Texas	14 March	Eich	S&ID, NASA
Engineering survey	New York, New York	14 March	Womack	S&ID, Avien Inc.
Negotiation summary	Houston, Texas	14-16 March	White, Bergeron, Meyers	S&ID, NASA
Equipment modifications discussion	Long Island, New York	15 March	Hagelberg, Ryan	S&ID, Gardner
Design concept presentation	Houston, Texas	15 March	Gatewood, Pringle, Stungis, Glenn	S&ID, NASA
Logistics requirements meeting	Culver City, California	15 March	Comensky	S&ID, Arnoux
Engineering surveillance and boilerplate test	Houston, Texas	15 March	Smith, Stewart	S&ID, NASA
Spacesuit interface meeting	Downey, California	15-16 March	DeWitt	S&ID, NASA, Hamilton Standard
Boilerplates modification meeting	Newberry Park, California	15-22 March	Brayton	S&ID, Northrop-Ventura
Removal and installation supervision	Tullahoma, Tennessee	15-29 March	Oiesik, Lofland	S&ID, AEDC

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APPENDIX B

DOCUMENTATION LIST

DOCUMENTATION LIST

The following documents were published during the report period:

SID 62-162	Apollo Training Plan
SID 62-300-10	Monthly Progress Report for Period 16 January 1963 to 15 February 1963
SID 63-153-1	ConfigurationPlan, Apollo Program, Part A
SID 63-153-2	ConfigurationPlan, Apollo Program, Part B
SID 62-99-13	Monthly Weight and Balance Report for the Apollo Spacecraft
SID 62-170-4	Apollo Wind Tunnel Program Report
SID 62-384-26	Drawing List, Apollo Spacecraft, Complete
SID 62-417	Ground Support Equipment Planning and Requirements
SID 62-777	Structural Analysis of the 0.045-Scale Apollo Force and Pressure Models (FS-3) and (PS-3)
SID 62-1244	Data Report for Apollo Model FS-3 Wind Tunnel Tests in Tunnels B and C of the AEDC Von Karman Gas Dynamics Facility
SID 63-143	Actual Weight and Balance Report for Dynamic Test - Boilerplate 9
SID 63-180	Apollo Documentation List
SID 63-21-3	Monthly Quality StatusReport, Apollo Spacecraft, February 1963
SID 62-267-39	Motion Picture Photography—Welding of the Launch Escape Tower, Fiberglassing and Sanding of the Heat Shield

SID 62-367-41	Motion Picture Photography—Ablative Test of a Heat Shield Component
SID 62-367-43	Motion Picture Photography—Transfer of Apollo Command Module Boilerplate 3 From the Factory Building to the Shipping Area at S&ID
SID 62-367-44	Motion Picture Photography—Ingress and Egress Tests of the Command Module and the Roofed and Enclosed Life Raft
SID 62-367-45	Motion Picture Photography—Status of Fabrication and Assembly of Apollo Command Module Boilerplates 6, 9, 12, 13, 15, 19, and 23 on 20 February 1963
SID 62-367-46	Motion Picture Photography—Northrop-Ventura Pre-Drop Test Activities of the Simple Cylindrical Bomb and Fabrication Activity of Parachute Test Vehicles 1 and 2
SID 62-367-47	Motion Picture Photography—Minneapolis-Honeywell Human Engineering Aspects of the Apollo Manual Controls Tests In a Cessna 310 Aircraft
SID 62-367-48	Motion Picture Photography—Interim Boilerplate Drop Test Program (ATR 201-A) at NAA/S&ID, Covered are Drop Tests 14, 15, and 16
SID 62-566-25	Still Photographs—Toxic Propellant Protective Suit, Command Module Operational Breadboard Phase I
63057	Composite Reel Plasmadyne
63059	Boilerplate 1 Interim Drop No. 16
7004-99-37A-B	Boilerplate 1 Interim Drop No. 16